

MARIN

ENVIRONMENTAL

Mar 18 10 27 AM '99

17 March 1999

Mr. Chuck Schwer
Department of Environmental Conservation
Waste Management Division
West Building, 103 South Main Street
Waterbury, Vermont 05671-0404

RE: *Initial Site Investigation Report,
Wheeler Sports, Lyndonville, VT 98-2509*

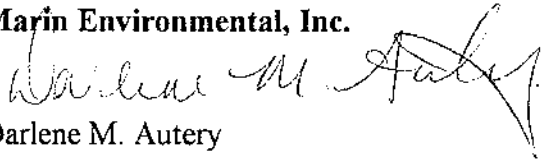
Dear Mr. Schwer,

Enclosed one bound copy of the Initial Site Investigation Report for Wheeler Sports, located in Lyndonville, Vermont.

Please contact me or Ron Miller, Regional Manager, if you have any questions or comments regarding this report.

Sincerely,

Marin Environmental, Inc.


Darlene M. Autery
Environmental Geologist

enclosure

cc: Bob Williams, Wheeler Sports, without enclosure

Ref: 98085C02.DOC

SCIENTISTS
ENGINEERS
GIS SPECIALISTS

1700 HEGEMAN AVENUE
COLCHESTER VT 05445
1.802.655.0011
1.800.520.6065
FAX 1.802.655.6076

116 CONSUMER SQUARE
SUITE 174
PLATTSBURGH NY 12901
1.518.566.8297
1.800.520.6065

7 ISLAND DOCK ROAD
HADDAM CT 06438
1.860.345.4578
1.800.524.9256
FAX 1.860.345.3854

600 CHARLTON STREET
SOUTHBIDGE MA 01550
1.508.764.8755
1.800.676.3707
FAX 1.508.764.4054

114 SOUTH STATE STREET
PO BOX 1414
CONCORD NH 03302
1.603.224.8871
1.800.636.6030
FAX 1.603.224.8688

INTERNET
WWW.MARINENV.COM

Mar 19 10 27 AM '99

SCIENTISTS
ENGINEERS
GIS SPECIALISTS

INITIAL SITE INVESTIGATION REPORT

WHEELER SPORTS
724 Broad Street
Lyndonville, Vermont

9 March 1999

Prepared for:

Robert Williams
P.O. Box 316
West Burke, VT 05871
Phone: 802-467-3027

Prepared by:

Marin Environmental, Inc.
1700 Hegeman Avenue
Colchester, Vermont 05446
Contact: Robert J. Ross
Phone: 802-655-0011

1700 HEGEMAN AVENUE

COLCHESTER, VT 05446

1.802.655.0011

1.800.520.6065

FAX 1.802.655.6076

116 CONSUMER SQUARE

SUITE 174

PLATTSBURGH, NY 12201

1.518.566.8297

1.800.520.6065

7 ISLAND DOCK ROAD

HADDAM, CT 06438

1.860.345.4578

1.800.524.9256

FAX 1.860.345.3854

600 CHARLTON STREET

SOUTHBURIDGE, MA 01550

1.508.764.8755

1.800.676.3707

FAX 1.508.764.4054

114 SOUTH STATE STREET

PO BOX 1414

CONCORD, NH 03302

1.603.224.8871

1.800.636.6030

FAX 1.603.224.8688

INTERNET

WWW.MAR-ENV.COM

MARIN Project #V98-085

MARIN Document #: 98085R02.DOC

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	
1.0 INTRODUCTION	1
1.1 Site Location and Physical Setting	1
1.2 Site History	2
1.3 Objectives and Scope of Work	3
2.0 INVESTIGATIVE PROCEDURES AND RESULTS	4
2.1 Soil Boring / Monitoring Well Installation	4
2.2 Soil-Screening Results	5
2.3 Determination of Ground-Water Flow Direction and Gradient	5
2.4 Ground-Water Sampling and Analysis	6
3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT	8
4.0 CONCLUSIONS	9
5.0 RECOMMENDATIONS	11
6.0 REFERENCES	12

Figures

Figure 1	Site Location Map
Figure 2	Site Map
Figure 3	Ground-Water Contour Map
Figure 4	Contaminant Distribution Map

Tables

Table 1	Ground-Water Elevation Data
Table 2	Ground-Water Analytical Results

APPENDIX A:	Soil Boring and Well Construction Logs
APPENDIX B:	Laboratory Report Forms
APPENDIX C:	Soil-Gas Survey Results - Ville Garage Site

EXECUTIVE SUMMARY

Marin Environmental, Inc. (Marin) has conducted an initial site investigation of subsurface petroleum contamination at Wheeler Sports in Lyndonville, Vermont. Field investigations included the installation of one UST-excavation monitoring well and two drilled soil borings/monitoring wells, field screening of subsurface soils for the presence of volatile organic compounds (VOCs), sampling and analysis of ground water from the monitoring wells, and an evaluation of potential risks to the environment and human health.

Marin's conclusions are summarized as follows:

- Three USTs were discovered at the site during an on-going investigation of petroleum contamination at the Ville Garage. The Ville Garage (DEC Site #97-2261) is located east and directly across U.S. Route 5 from the site.
- On 29 September 1998, the three unregistered, out-of-service gasoline underground storage tanks (USTs) were removed from the site. These tanks consisted of a 2,500-gallon UST (UST #1) and two 1,000-gallon USTs (UST #2 and UST #3). The USTs were found to be in poor condition with a hole at the bottom of UST #3. Photoionization detector (PID) readings of up to 1,401 parts per million (ppm) were measured in the UST #1 excavation. PID readings of up to 1,907 ppm were measured in the excavation that contained UST #2 and #3. Ground water was encountered at about eight feet below ground surface (bgs) in the UST #1 excavation. One monitoring well, (MW-10) was installed in the UST excavation.
- Gasoline appears to have been released to the subsurface at the site.
- Gasoline compounds were detected in samples collected from MW-10 at levels exceeding Vermont Ground Water Enforcement Standards (VGESs) for ethylbenzene, 1,3,5-trimethyl benzene, 1,2,4-trimethyl benzene, and naphthalene. Total benzene, toluene, ethylbenzene, and xylene (BTEX) concentrations in this well measured 3,149 parts per billion (ppb).
- Methyl-tertiary butyl ether (MTBE) was not detected in any of the ground-water samples collected at the site. MTBE was introduced as an octane booster in the early 1980's. The absence of MTBE in the ground water samples suggests an older gasoline source. This is consistent with site history. The site reportedly operated as gasoline service station from the 1930s to the 1970s. Although the sale of gasoline had discontinued, gasoline remained in the USTs at the site.
- No gasoline compounds were detected in the ground water samples collected from MW-11 and MW-12 located 80 and 110 feet west of the former USTs, respectively. The two monitoring wells installed in the presumed downgradient direction from the on-site USTs appear to actually be upgradient. As a result, the lateral extent of ground-water contamination could not be determined with this work scope. However, June 1998 ground-water sample analysis results from monitoring well MW-9, which is located approximately 55 feet downgradient of the former USTs at the Wheeler Sports site, suggest that the on-site ground-water contamination is limited in lateral extent. Total benzene, toluene, ethylbenzene and xylene (BTEX) concentrations in the MW-9 sample were 15.8 parts per billion (ppb). The presence of the gasoline additive methyl-tertiary butyl ether (MTBE) at 207 ppb also suggests that the releases from the Ville Garage site represent at least a portion of the contamination at this location.

EXECUTIVE SUMMARY

- Ground water appears to be directed towards the municipal sewer and water lines to the east of the former USTs, where higher conductivity backfill could be influencing ground-water flow patterns.
- A soil-gas survey performed by **Marin** as part of the Ville Garage investigation extended to the area between the subject parcel's former UST location and the utility lines. Slightly elevated PID readings (1.2 to 3.7) were measured in this area.
- No drinking-water supplies appear to be threatened; the site and surrounding properties are supplied with drinking water from a municipal system.
- The unconsolidated surficial materials comprising the shallow soil aquifer at the site consist predominantly of fine sand and silt. On 23 November 1998, the water table was found to be between 7.6 and 9.4 feet below ground surface and to exhibit a northeasterly-trending gradient of 0.2 percent. Ground-water flow velocities are expected to be between 0.1 to 1 foot per day.

On the basis of the results of this investigation and the conclusions stated above, **Marin** makes the following recommendations.

1. Presently, no monitoring wells are located between the former USTs and the utility lines. To evaluate the potential impacts to the utilities, **Marin** recommends installing an additional soil boring/monitoring well downgradient of the former USTs.
2. Water levels should be obtained from the new and existing monitoring wells. Ground-water samples should be collected from MW-10 and the new monitoring well and should be analyzed for volatile petroleum compounds by EPA Method 8021B. Samples should not be collected from MW-11 or MW-12 unless ground-water flow directions vary. Sampling should be performed in conjunction with Ville Garage quarterly sampling. The ground-water and contaminant contour maps should be unified with the Ville Garage maps..

1.0 INTRODUCTION

This report details the results of an initial site investigation of subsurface petroleum contamination at Wheeler Sports, located on Broad Street in the town of Lyndonville, Vermont. This report has been prepared by Marin Environmental, Inc. (**Marin**) for Robert Williams, owner of the property. The site investigation was initiated with Vermont Department of Environmental Conservation (VT DEC) approval under the State's "expressway" notification process following the discovery of subsurface petroleum contamination during the removal of three underground storage tanks (USTs); a 2,500-gallon gasoline tank (UST #1), and two 1,000-gallon gasoline tanks (UST #2 and UST #3).

1.1 Site Location and Physical Setting

The site is located on the west side of U.S. Route 5 (Broad Street) approximately 0.3 miles south of the center of the Village of Lyndonville (Figure 1). Property in the area is zoned for mixed residential and commercial development. The site is bounded to the north by a laundromat, to the west by an undeveloped parcel of land followed by railroad tracks, and to the south by a restaurant. U.S. Route 5 forms the eastern boundary of the site. Ville Garage (DEC Site # 97-2261) is located on the east side of Route 5 across from the site. The Ville Garage site is undergoing quarterly environmental monitoring due to soil and ground-water contamination associated with gasoline and diesel releases from USTs on that property.

Drinking-water and sewer services are supplied to the site and surrounding buildings by municipal systems. Municipal utility lines for the area parallel the east and west sides of Route 5. No private or public water supply wells are reportedly near the site.

The average elevation of the ground surface is approximately 720 feet above mean sea level. Surface drainage and presumed ground-water flow direction in the area follow the topographic slope west toward the Passumpsic River, whose closest point is approximately 1,300 feet west of the site (USGS, 1986).

Native surficial materials in the vicinity of the site are mapped as fluvial sands and gravels, and well sorted littoral sands (Stewart and MacClintock, 1970). The underlying bedrock is mapped as the Waits River Formation, which consists of gray quartzose and micaceous crystalline limestone of Lower Devonian age (Doll, 1961). No bedrock outcrops were observed on or near the site.

1.2 Site History

The site is currently occupied by a single building, which includes a retail sports apparel store (Wheeler Sports), and an auto parts store. Mr. Robert Williams is the owner of the property; the businesses are owned independently. Mr. Williams has owned the property since 1977 when he purchased the property from Paul and Katherine Cray (Book 76, Page 495). The site was vacant at the time of purchase but had most recently been occupied by an automobile dealership. The site reportedly operated as a gasoline service station from the 1930s through the 1970s. After Mr. Williams purchased the property, the building was renovated for retail business.

On 29 September 1998, **Marin** inspected the removal of three unregistered, out-of-service USTs from the subject parcel. Fred's Plumbing and Heating and Mario Paul Excavating of Derby, Vermont performed the UST cleaning, purging and excavation services.

The three USTs were found to be in fair to poor condition upon removal, with surface rust and pitting on all the USTs and a hole at the bottom of UST #3. The associated fill, suction-line, and vent-line piping for all three USTs were of galvanized piping which was rusty and in poor condition at the time of the closure assessment.

Soils in the UST #1 excavation consisted of sand and gravel backfill to a depth of approximately seven feet below ground surface (bgs), overlying municipal type waste including bricks, metal and glass. The soils in the UST #2 and UST #3 excavation consisted of a sandy backfill. Strong petroleum odors were noted throughout both excavations.

Photoionization detector (PID) readings on soil samples collected from the UST #1 excavation ranged from 0.0 to 1,401 parts per million (ppm), with an average of 296 ppm. The highest PID reading in this excavation was noted at the south end of UST #1 at a depth of 8 feet bgs. The soil contamination extended to ground water, which was encountered at 8.5 feet bgs. A ground-water monitoring well (MW-10) was installed in this excavation.

PID readings on soil samples collected from the UST #2 and UST #3 excavation ranged from 10 to 1,907 ppm, with an average of 492 ppm. The highest PID readings from this excavation were observed on soil samples collected on the east side of UST #2 at a depth of four feet bgs. Ground water was not encountered in this excavation.

Marin initiated a site investigation in accordance with the VT DEC "expressway" process after receiving approval from Mr. Williams on 2 September 1998.

1.3 Objectives and Scope of Work

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these objectives, **Marin** has:

- Reviewed existing historical site data;
- Supervised the installation of one UST-excavation well (MW-10) and two drilled soil borings/monitoring wells (MW-11 and MW-12), and determined the local

ground-water flow direction, gradient, approximate velocity and contaminant distribution;

- Screened subsurface soils from the well borings for VOC content using a PID;
- Collected and submitted ground-water samples from the on-site monitoring wells for laboratory analysis of volatile petroleum compounds;
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors;
- Evaluated the need for treatment and/or a long-term monitoring plan for the site; and
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions and offers recommendations for further action.

2.0 INVESTIGATIVE PROCEDURES AND RESULTS

2.1 Soil Boring / Monitoring Well Installation

In order to evaluate the degree of contamination at the site, one monitoring well was installed within the former UST #1 location (MW-10) and two soil boring/monitoring wells (MW-11 and MW-12) were installed in the presumed downgradient direction. Approximate well locations are shown on Figure 2; well construction details are presented in Appendix A.

The soils encountered in boring MW-11 consisted of light brown, fine to medium sand overlying gray fine sand. The soils encountered at MW-12 consisted of dark-brown, fine sand with some gravel; overlying, fine sand and silt with varved layers and organic material. Ground water was encountered at approximately ten feet below ground surface (bgs) at both locations.

The monitoring wells were installed by Tri-State Drilling and Boring of West Burke, Vermont using the hollow-stem auger (HSA) drilling method. Soil samples were collected at five-foot intervals from each boring using a standard split-spoon barrel. Sample recovery was fair to good, generally ranging from 33 to 66 percent. The samples obtained were screened for the possible presence of volatile organic compounds (VOCs) with a PID and logged for lithology by a **Marin** field geologist. All downhole drilling and sampling equipment was decontaminated during use as appropriate.

All of the monitoring wells were developed by hand using dedicated bailers. None of the wells contained free-phase product during development. Development water was discharged directly to the ground surface in the vicinity of each well.

2.2 Soil-Screening Results

PID screening on soil samples from the drilled monitoring wells installed in the presumed downgradient location did not detect evidence of significant contamination. With the exception of a 1.8 ppm PID reading on the MW-12, 5-7' soil sample, all PID readings were 0.0 ppm. PID screening results and sample depths are included on the boring logs in Appendix A.

A **Marin** field geologist screened soil samples from each soil boring for the presence of VOCs using a PE PhotoVac model 2020 portable PID. The PID was calibrated with an isobutylene standard gas to a benzene reference on the same day as drilling activities.

2.3 Determination of Ground-Water Flow Direction and Gradient

Ground water in the unconfined surficial aquifer directly beneath the site appears to be flowing in a northeasterly direction. Regional ground-water flow had originally been interpreted to flow west towards the Passumpsic River, based on topography and ground-water flow directions at the Ville Garage site on the east side of U.S. Route 5. The highly permeable fill material surrounding the municipal utilities, which are within 20 feet to the east of the former USTs, may be influencing the local ground-water flow direction. The average gradient of the local ground-water table on 23 November 1998 was approximately 0.26 percent. Water-level measurements and elevation calculations are

presented in Table 1. The ground-water contour map (Figure 3) was prepared using this data.

On 23 November 1998, depths to water ranged from 7.6 feet (MW-10) to 9.4 feet (MW-12) below ground surface. To assist in determining ground-water flow directions, the water level was measured in MW-9, located on the site but installed as part of the Ville Garage investigation. No free-phase petroleum was observed in any of the wells. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum, located on the Ville Garage site of 100.00 feet.

The sandy soils comprising the shallow aquifer at the site typically exhibit effective porosities of about 0.3 to 0.4, with hydraulic conductivities ranging between 2.5 and 140 feet per day (Fetter, 1994). Assuming Darcian flow, these estimated conductivities combine with the calculated ground-water gradient of 0.26 to yield an estimated range of ground-water flow velocities in the surficial aquifer of between 0.01 and 1 foot per day.

2.4 Ground-Water Sampling and Analysis

Ground-water analytical results indicate that ground water in the shallow soil aquifer in the immediate vicinity of the former on-site USTs is contaminated with gasoline compounds. The two monitoring wells (MW-11 and MW-12) installed in the presumed downgradient direction from the on-site USTs appear to actually be upgradient. As a result, the lateral extent of ground-water contamination could not be determined with this work scope. However, June 1998 ground-water sample analysis results from monitoring well MW-9, which is located approximately 55 feet downgradient of the former USTs at the Wheeler Sports site, suggest that the on-site ground-water contamination is limited in lateral extent. Total benzene, toluene, ethylbenzene and xylene (BTEX) concentrations in the MW-9 sample were 15.8 parts per billion (ppb). The presence of the gasoline additive methyl tertiary butyl ether (MTBE) at 207 ppb also suggests that the releases from the Ville Garage site represent at least a portion of the contamination at this location. MTBE was not used in gasoline at the time the USTs on the Wheeler Sports property were

reportedly taken out of service, and MTBE was not detected in the ground water sample collected from the immediate vicinity of these USTs. Analytical results are summarized in Table 2, a contaminant distribution map is presented as Figure 4, and laboratory report forms are included in Appendix B.

Vermont Ground-Water Enforcement Standards (VGESs)¹ for volatile petroleum compounds ethyl benzene, 1,3,5-trimethyl benzene, 1,2,4-trimethyl benzene, and naphthalene were exceeded in MW-10. The detection limit for benzene exceeded the VGES at MW-10, due to the presence of high levels of other constituents. The total BTEX concentrations were 3,149 ppb. No volatile petroleum hydrocarbons were detected in the samples collected from MW-11 or MW-12, presumably because the wells are actually upgradient of the on-site USTs.

Ground-water samples were collected from the three on-site monitoring wells on 23 November 1998. Each monitoring well was purged and then sampled using dedicated bailers and dropline. Trip blank and duplicate samples were collected to ensure that adequate quality assurance/quality control (QA/QC) standards were maintained. All field procedures were conducted in accordance with **Marin** standard protocols. Purge water was discharged directly to the ground in the vicinity of each well.

The ground-water samples were submitted to Endyne, Inc. of Williston, Vermont, where they were analyzed for the possible presence of volatile petroleum compounds by U.S. EPA Method 8021B. Analytical results from the QA/QC samples indicate that adequate QA/QC was maintained during sample collection and analysis; no VOCs were detected in the trip blank, and analytical results for the duplicate sample were within about nine percent of the original sample results (Table 2).

¹The Vermont DEC has established Vermont Groundwater Enforcement Standards (VGESs) for eight petroleum related VOCs, as follows: benzene - 5 ppb; toluene - 1,000 ppb; ethylbenzene - 700 ppb; xylenes - 10,000 ppb; 1,2,4-trimethyl benzene - 4 ppb; 1,3,5- trimethylbenzene - 5 ppb; naphthalene - 20ppb; and MTBE, a gasoline additive, - 40 ppb.

3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

Marin conducted a survey to identify sensitive receptors in the vicinity of the site that could potentially be impacted. The following sensitive receptors were identified.

- The nearest surface-water body is the Passumpsic River, whose closest point to the site is approximately 1,300 feet to the west.
- Municipal water and sewer lines are within 20 feet east of the recently removed gasoline USTs. Contaminant vapors could preferentially follow these lines and accumulate in manholes.

On the basis of the information obtained during this investigation, **Marin** has qualitatively assessed the risks that the subsurface contamination poses to human health and the environment. Our findings are as follows:

- The risk posed by on-site contamination to water quality in the Passumpsic River appears low, because shallow ground-water flow at the site appears to be flowing to the northeast, away from the river. Furthermore, no volatile petroleum hydrocarbons were detected in the ground-water samples collected from wells located between the former UST locations and the Passumpsic River.
- The risk of human exposure through direct contact with residual petroleum-contaminated soils is considered to be low. Elevated PID readings (10.2 to 34.2) were measured on soil samples within five feet of the ground surface during the UST excavation. However, the excavation was covered with approximately five feet of clean backfill. Direct contact with contaminated soils is possible, however, if surface and subsurface soils are disturbed. Appropriate precautions should be implemented if activities requiring excavation should take place.
- The risk of ingestion of contaminated ground water appears to be very low. All drinking water used in the surrounding area is provided by the municipal system whose source is the East Reservoir located approximately 1.5 miles east of the site. No drinking-water supply wells were identified in the immediate vicinity of the site.

- The risk of vapor entry into water and sewer manholes has not been adequately evaluated as part of this study. However, as part of **Marin's** investigation of the Ville Garage, a soil gas survey was performed. The survey included the area between the former USTs and the utility lines. Slightly elevated PID readings (1.2 to 3.7) were measured in this area. A summary of this data is shown on a figure provided as Appendix C, from the Ville Garage investigation report.

4.0 CONCLUSIONS

Based on the results of the site investigation described above, **Marin** concludes the following:

- Three USTs were discovered at the site during an on-going investigation of petroleum contamination at the Ville Garage. The Ville Garage (DEC Site #97-2261) is located east and directly across Route 5 from the site.
- On 29 September 1998, the three unregistered, out-of-service gasoline underground storage tanks (USTs) were removed from the site. These tanks consisted of a 2,500-gallon UST (UST #1) and two 1,000-gallon USTs (UST #2 and UST #3). The USTs were found to be in poor condition with a hole at the bottom of UST #3. Elevated photoionization detector (PID) readings reached 1,401 parts per million in the UST #1 excavation and 1,907 in the excavation that contained both UST #2 and #3. Ground water was encountered at about eight feet below ground surface (bgs) in the UST #1 excavation only and a monitoring well was installed (MW-10).
- Gasoline appears to have been released to the subsurface at the site.
- Gasoline compounds were detected in samples collected MW-10 at levels exceeding Vermont Ground Water Enforcement Standards (VGESs) for ethyl-benzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, and naphthalene. Total benzene, toluene, ethylbenzene, and xylene (BTEX) concentrations in this well measured 3,149 parts per billion (ppb).
- Methyl-tertiary butyl ether (MTBE) was not detected in any of the ground-water samples collected at the site. MTBE was introduced as an octane booster in the early 1980's. The absence of MTBE in the ground water samples suggests an older gasoline source. This is

consistent with site history. The site operated as gasoline service station from the 1930's to the 1970s, reportedly. Although the sale of gasoline had discontinued, gasoline remained in the USTs at the site.

- Petroleum contamination from the former on-site USTs appears to be limited to the immediate vicinity of the former USTs.
- No gasoline compounds were detected in the ground water samples collected from MW-11 and MW-12 located 80 and 110 feet west of the former USTs, respectively. The two monitoring wells installed in the presumed downgradient direction from the on-site USTs appear to actually be upgradient. As a result, the lateral extent of ground-water contamination could not be determined with this work scope. However, June 1998 ground-water sample analysis results from monitoring well MW-9, which is located approximately 55 feet downgradient of the former USTs at the Wheeler Sports site, suggest that the on-site ground-water contamination is limited in lateral extent. Total benzene, toluene, ethylbenzene and xylene (BTEX) concentrations in the MW-9 sample were 15.8 parts per billion (ppb). The presence of the gasoline additive methyl tertiary butyl ether (MTBE) at 207 ppb also suggests that the releases from the Ville Garage site represent at least a portion of the contamination at this location.
- Ground water appears to be directed towards the municipal sewer and water lines to the east of the former USTs, where higher conductivity backfill could be influencing groundwater flow patterns.
- A soil-gas survey performed by **Marin** as part of the Ville Garage investigation extended to the area between the subject parcel's former UST location and the utility lines. Slightly elevated PID readings (1.2 to 3.7) were measured in this area.
- No drinking-water supplies appear to be threatened; the site and surrounding properties are supplied with drinking water from a municipal system.
- The unconsolidated surficial materials comprising the shallow soil aquifer at the site consist predominantly of fine sand and silt. On 23 November 1998, the water table was found to be

between 7.6 and 9.4 feet below ground surface and to exhibit a easterly-trending gradient of 0.2 percent. Ground-water flow velocities are expected to be between 0.1 to 1 foot per day.

5.0 RECOMMENDATIONS

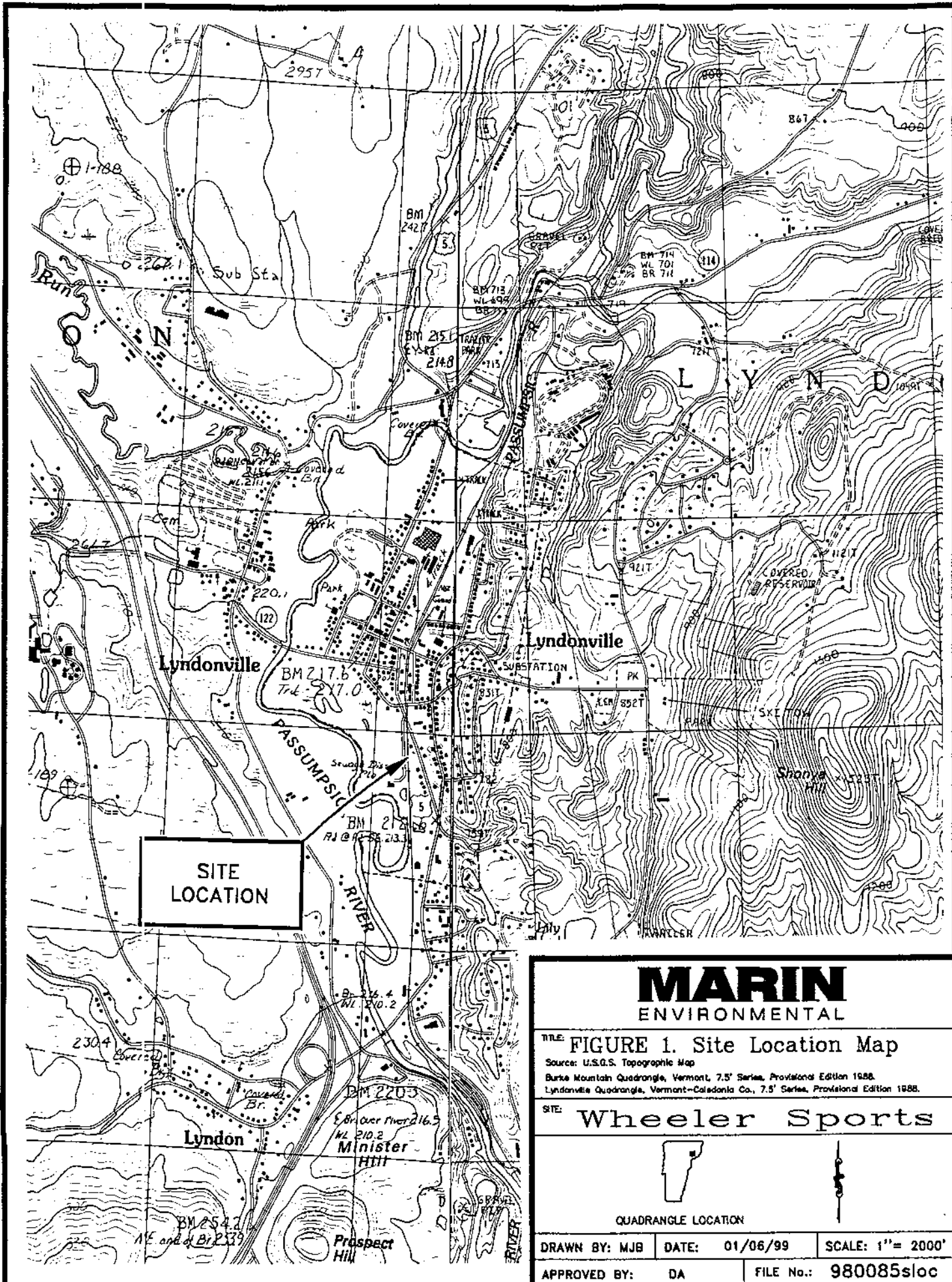
On the basis of the results of this investigation and the conclusions stated above, **Marin** makes the following recommendations.

1. Currently, no monitoring wells are located between the former USTs and the utility lines. To evaluate the potential impacts to the utilities, **Marin** recommends installing an additional soil boring/monitoring well downgradient of the former USTs.
2. Water levels should be obtained from the new and existing monitoring wells. Ground-water samples should be collected from MW-10 and the new monitoring well and should be analyzed for volatile petroleum compounds by EPA Method 8021B. Samples should not be collected from MW-11 or MW-12 unless flow directions vary. Sampling should be performed in conjunction with Ville Garage quarterly sampling. The ground-water and contaminant contour maps should be unified with the Ville Garage maps.

6.0 REFERENCES

- Doll, C.G. and others, 1961. *Geologic Map of Vermont*, Office of the State Geologist.
- Domerico, P.A., and Schwartz, F.W., 1990. *Physical and Chemical Hydrogeology*, John Wiley and Sons, New York, 824 p.
- Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 691 p.
- Stewart, D.P. and MacClintock, P., 1970. *Surficial Geologic Map of Vermont*, Office of the State Geologist.
- USGS, 1986. Lyndonville Quadrangle Vermont. U.S. Geological Survey. 7.5 minute series (topographic). Provisional Edition, 1986.
- USGS, 1988. Burke Mountain Quadrangle Vermont. U.S. Geological Survey. 7.5 minute series (topographic). Provisional Edition, 1986.

FIGURES





MARIN

ENVIRONMENTAL

TITLE: FIGURE 1. Site Location Map

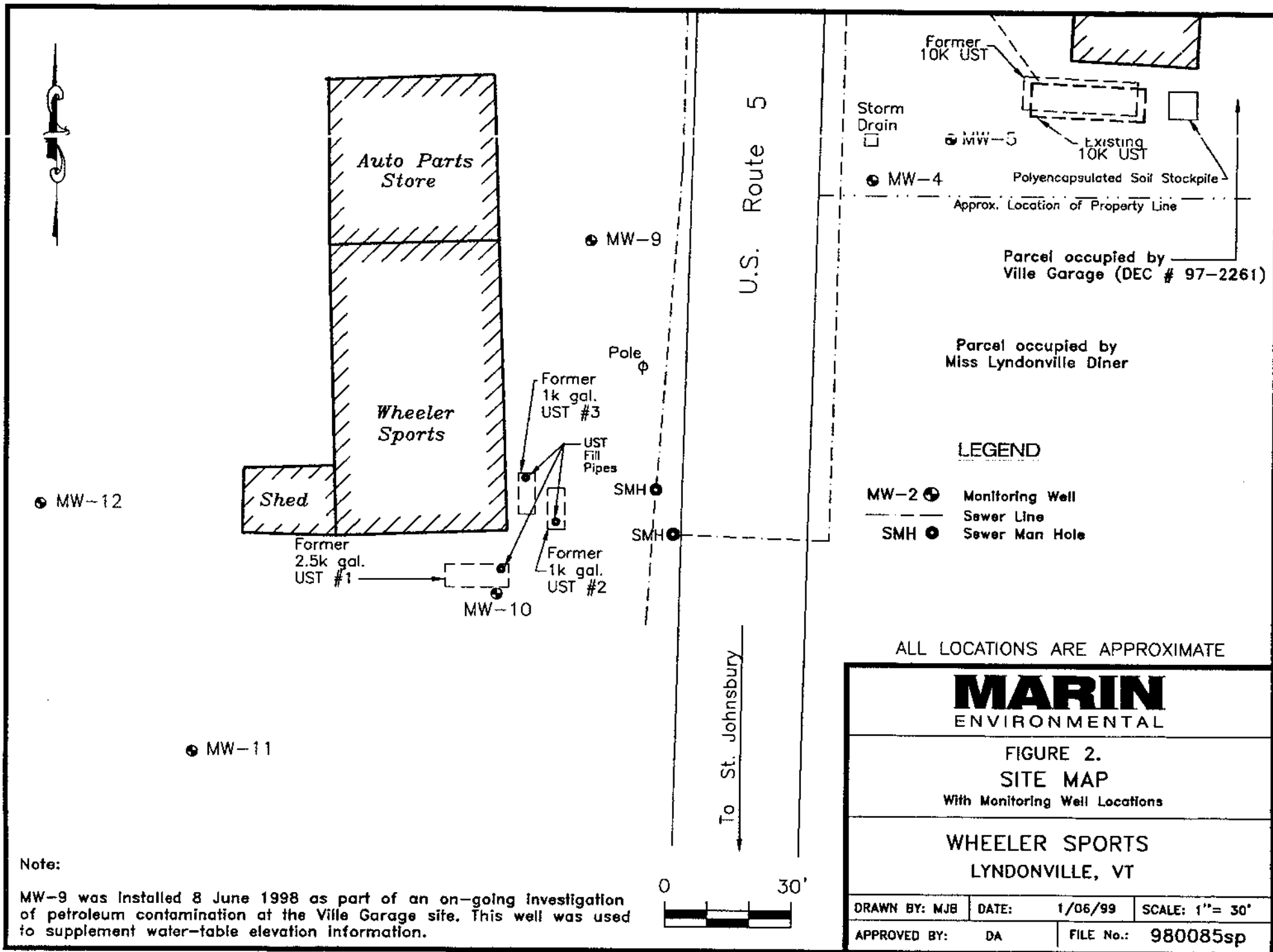
Source: U.S.G.S. Topographic Map
 Burke Mountain Quadrangle, Vermont, 7.5' Series, Provisional Edition 1988.
 Lyndonville Quadrangle, Vermont-Caledonia Co., 7.5' Series, Provisional Edition 1988.

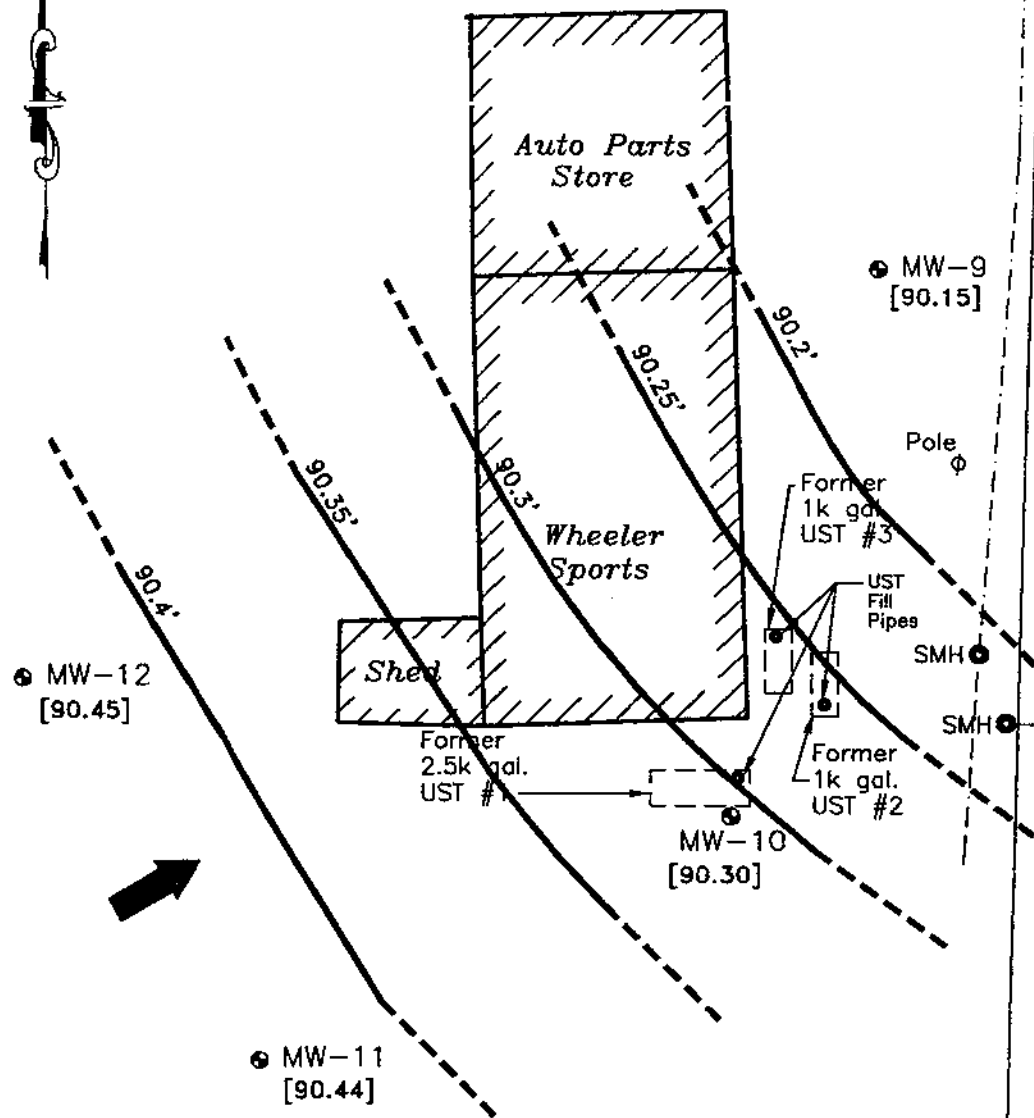
SITE: Wheeler Sports

QUADRANGLE LOCATION

DRAWN BY: MJB	DATE: 01/06/99	SCALE: 1"= 2000'
APPROVED BY: DA	FILE No.: 980085sloc	





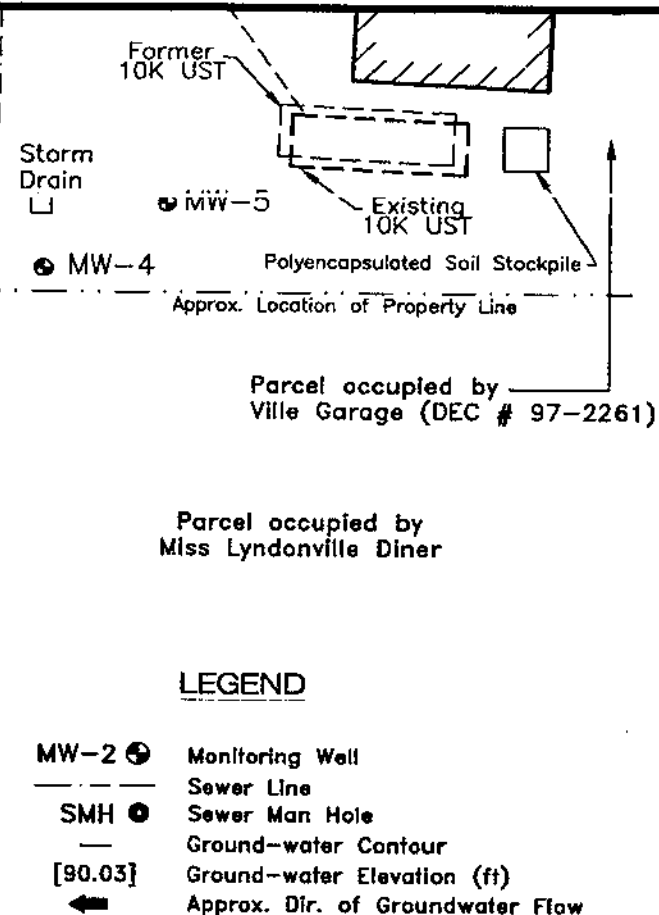
Note:

MW-9 was installed 8 June 1998 as part of an on-going investigation of petroleum contamination at the Ville Garage site. This well was used to supplement water-table elevation information.



U.S. Route 5

To St. Johnsbury



ALL LOCATIONS ARE APPROXIMATE

MARIN
ENVIRONMENTAL

FIGURE 3.
GROUND-WATER CONTOUR MAP
MONITORING DATE: 23 November 1998

WHEELER SPORTS
LYNDONVILLE, VT

DRAWN BY: MJB	DATE: 1/06/99	SCALE: 1" = 30'
APPROVED BY: DA	FILE No.: 980085sp	

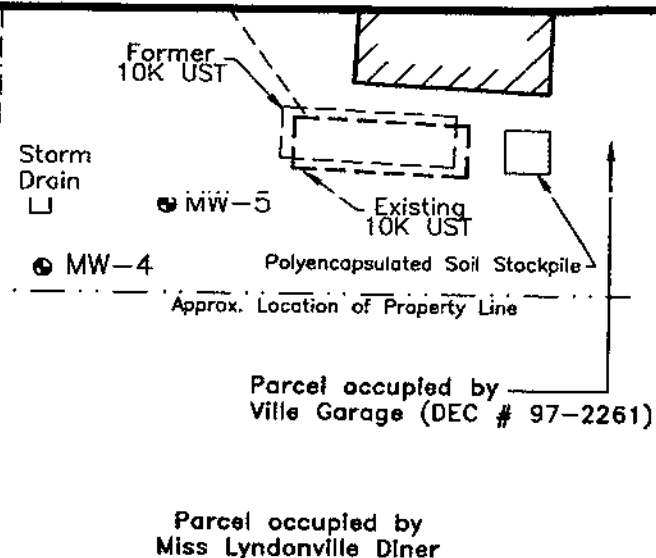
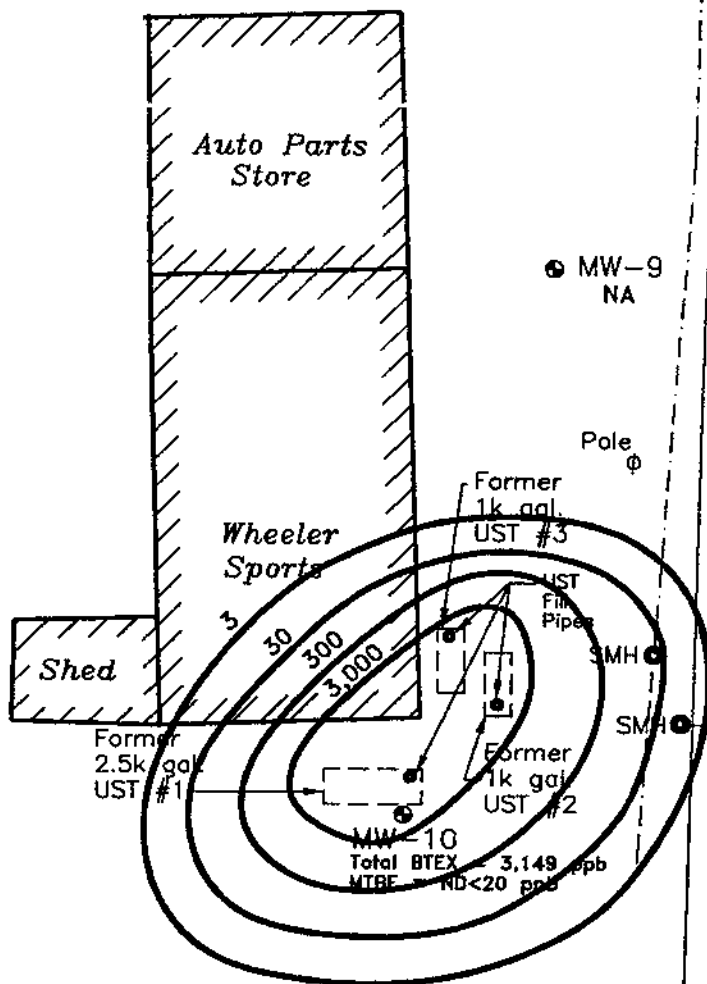


● MW-12
Total BTEX = ND<1 ppb
MTBE = ND<1 ppb

● MW-11
Total BTEX = ND<1 ppb
MTBE = ND<1 ppb

Note:

MW-9 was installed 8 June 1998 as part of an on-going investigation of petroleum contamination at the Ville Garage site. This well was used to supplement water-table elevation information.



LEGEND

- MW-2 ● Monitoring Well
- Sewer Line
- SMH ● Sewer Man Hole
- Contaminant Contour
- ND None Detected
- NA Not Analyzed as part of this study
- BTEX Benzene, Toluene, Ethyl benzene, Xylenes
- MTBE Methyl tertiary butyl ether

ALL LOCATIONS ARE APPROXIMATE

MARIN
ENVIRONMENTAL

FIGURE 4.
CONTAMINANT DISTRIBUTION MAP
MONITORING DATE: 23 November 1998

WHEELER SPORTS
LYNDONVILLE, VT

DRAWN BY: MJB	DATE: 1/06/99	SCALE: 1"= 30'
APPROVED BY: DA	FILE No.: 980085sp	

TABLES

TABLE 1. WATER TABLE ELEVATIONS

Wheeler Sports
Lyndonville, Vermont

Well I. D.	Top of Casing Elevation *	Depth to Water (feet from TOC)	Ground Water Elevation
MW-9	98.66	8.51	90.15
MW-10	97.92	7.62	90.30
MW-11	99.32	8.88	90.44
MW-12	101.81	11.36	90.45

Notes:

1. Top of casing (TOC) and ground water elevations are relative to an arbitrary site site datum of 100.00
2. Monitoring Date: 23 November 1998

TABLE 2. GROUND-WATER ANALYSIS RESULTS

**Wheeler Sports
Lyndonville, Vermont**

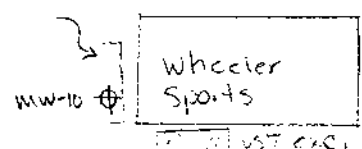
Monitoring Well	Benzene	Toluene	Ethyl- benzene	Xylenes	Total BTEX	1,3,5- Trimethyl- benzene	1,2,4- Trimethyl- benzene	Napthalene	MTBE
MW-10	TBQ <20	29.0	1,120	2,000	3,149	677	2,110	352	ND <20
MW-11	ND <1	ND <1	ND <1	ND <1	ND	ND <1	ND <1	ND <1	ND <1
MW-12	ND <1	ND <1	ND <1	ND <1	ND	ND <1	ND <1	ND <1	ND <1
MW-10 (Duplicate)	TBQ <20	28.6	1,030	1,820	2,879	626	1,960	308	ND <20
Trip Blank	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1	ND <1
VGES*	5	1000	700	10,000	—	4	5	20	40

Notes

1. Units are in ug/L equivalent to parts per billion
2. VGES = Vermont Groundwater Enforcement Standards.
3. Shading indicates that the value exceeds the VGES for the analyte.
4. Monitoring Date: 23 November 1998.

APPENDIX A

Soil Boring and Well Construction Logs

SITE NAME: Wheeler Sports LOCATION: Lyndaville, VT JOB NO. VT98-185 DATE: 9/29/98				BORING NO: MW-10 TOTAL DEPTH: 13' DEPTH TO WATER: ~8.5'				UST excavation 			
DRILLING METHOD: N/A				FIELD SUPERVISOR: D. Aubrey / J. Gonyea				CONTRACTOR:			
BORING DIAMETER: N/A				DRILLERS:				Boring Well Location: N →			

Depth	SN	BLOW COUNTS PER 6"					Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL		PID (ppm)
		0-6	6-12	12-18	18-24						
5'								Sand to ~1.5' Sand and Gravel to ~7.5'	backfill	Riser	
10'								Municipal type solid waste starting at ~7.5'	backfill	PVC Well Screen	
15'								Bottom of excavation ~13' Monitoring well installed in UST excavation.	backfill		
20'									backfill		
25'									backfill		
30'									backfill		
35'									backfill		
40'											

		BLOW COUNT		MATERIALS USED	SIZE/TYPE	QUANTITY
AND	33-50%	0-4	VERY LOSE	WELL SCREEN		
SOME	20-33%	4-10	LOOSE	SLOT SIZE		
LITTLE	10-20%	10-30	MEDIUM	RISER		
TRACE	0-10%	30-50	DENSE	GRADED SAND		
		> 50	VERY DENSE	BENTONITE PELLETS		
				BENTONITE GROUT		

SITE NAME: Wheeler Sports		BORING NO: MW-11								
LOCATION: Lyndonville, VT		TOTAL DEPTH: 15'								
JOB NO. VT98-08.5		DEPTH TO WATER: ~10'								
DATE: 11/12/98		DRILLING METHOD: hollow stem auger		FIELD SUPERVISOR: BR + JB						
BORING DIAMETER: 4"		CONTRACTOR: Tri-State		DRILLERS: Wayne + Jason						
BLOW COUNTS PER 6"		Boring/Well Location		RTS						
Depth	SN	0	6	12	18	24	Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL	PID (ppm)
5'-7'		5	3	3	3	12/24		- medium to fine light brown sand	Riser	0.0
10'-12'		3	5	3	5	8/24		- gray fine sand, little silt, wet (saturated) - water @ approx. 10'	Screen	0.0
13'								- high organic content on auger		
15'								Bottom of Boring 15' - no refusal		
20'										
25'										
30'										
35'										
40'										

		BLOW COUNT		MATERIALS USED		SIZE/TYPE		QUANTITY	
AND	33-50%	0-4	VERY LOSE	WELL SCREEN	2 inch	10 ft			
SOME	20-33%	4-10	LOOSE	SLOT SIZE	10 slot				
LITTLE	10-20%	10-30	MEDIUM	RISER	2 inch	4.5'			
TRACE	0-10%	30-50	DENSE	GRADED SAND	#1 sand (100lb)	2 1/2 bags			
		> 50	VERY DENSE	BENTONITE PELLETS	50lb bags	1 1/2 bag			
				BENTONITE GROUT					

Marin Environmental, Inc.

SITE NAME: Wheeler Sports
LOCATION: Lyndonville, VT
JOB NO. VT 48-0085
DATE: 11/12/98

BORING NO: MW-12
TOTAL DEPTH: 17'
DEPTH TO WATER: ~10 ft

DRILLING METHOD
- hollow stem auger
BORING DIAMETER
4 inch

FIELD SUPERVISOR: BR + JB
CONTRACTOR: Tri-State

DRILLERS: Wayne + Jason

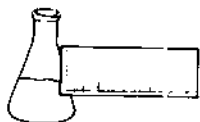
Boring/Well Location

Depth	SN	BLOW COUNTS PER 6"						Rec.	SAMPLE DESCRIPTION/COMMENTS	WELL DETAIL			PID (ppm)
		0	6	12	18	24							
5'-7'		2	3		6	9		14/26	- Top 9" light brown, VF sand + silt - bottom 5" dk brown, fine sand, some gravel				1.8
10'-12		5	9		15	9		0/26	- spoon wet - lt brown silty H ₂ O on spoon				N/A
15'-17		2	2		1	1		16/24	- gray VF sand + silt, varved layers, brown organic stringers				0.0
20'									BOB @ 17' no refusal				
25'									note: Bottom of well at 15.5'				
30'													
35'													
40'													

		BLOW COUNT		MATERIALS USED		SIZE/TYPE	QUANTITY
AND	33-50%	0-4	VERY LOSE	WELL SCREEN		2"	10 ft
SOME	20-33%	4-10	LOOSE	SLOT SIZE		10 slot	
LITTLE	10-20%	10-30	MEDIUM	RISER		2"	8 ft
TRACE	0-10%	30-50	DENSE	GRADED SAND		#1	3 bags
		> 50	VERY DENSE	BENTONITE PELLETS		50 lb bags	1/2 bag
				BENTONITE GROUT			

APPENDIX B

Laboratory Report Forms



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Marin Environmental
PROJECT NAME: Wheeler Sports
REPORT DATE: December 3, 1998
DATE SAMPLED: November 23, 1998

PROJECT CODE: GWVT1728
REF.#: 131,621 - 131,625

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

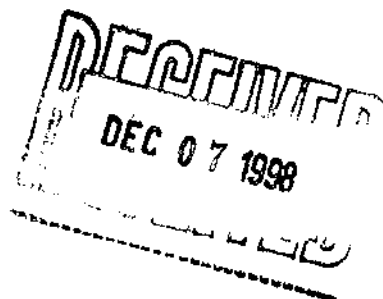
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

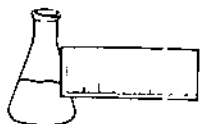
Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

enclosures





ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 8021B--PURGEABLE AROMATICS

CLIENT: Marin Environmental

DATE RECEIVED: November 23, 1998

PROJECT NAME: Wheeler Sports

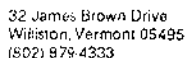
REPORT DATE: December 3, 1998

CLIENT PROJ. #: NI

PROJECT CODE: GWVT1728

Ref. #:	131,621	131,622	131,623	131,624	131,625
Site:	Trip Blank	Duplicate	MW-12	MW-11	MW-10
Date Sampled:	11/23/98	11/23/98	11/23/98	11/23/98	11/23/98
Time Sampled:	9:05	NI	10:10	10:20	10:30
Sampler:	J. Bierly	J. Bierly	J. Bierly	J. Bierly	J. Bierly
Date Analyzed:	11/30/98	12/3/98	12/3/98	12/2/98	12/3/98
UIP Count:	0	> 10	0	0	> 10
Dil. Factor (%):	100	5	100	100	5
Surr % Rec. (%):	98	96	94	87	98
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
MTBE	<1	<20	<1	<1	<20
Benzene	<1	TBQ <20	<1	<1	TBQ <20
Toluene	<1	28.6	<1	<1	29.0
Ethylbenzene	<1	1,030.	<1	<1	1,120.
Xylenes	<1	1,820.	<1	<1	2,000.
1,3,5 Trimethyl Benzene	<1	626.	<1	<1	677.
1,2,4 Trimethyl Benzene	<1	1,960.	<1	<1	2,110.
Naphthalene	<1	308.	<1	<1	352.

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated



28902

Project Name: <u>Wheeler Sports</u>	Reporting Address: <u>1700 ...</u>	Billing Address: <u>Same</u>
Site Location: <u>Lyndonville, VT</u>	<u>Caledonia, VT</u>	
Endyne Project Number: <u>GWV1728</u>	Company: <u>Memo Corp</u>	Sampler Name: <u>Jason Brierly</u>
	Contact Name/Phone #: <u>D. Adley 655-0001</u>	Phone #: <u></u>

[illegible]

Relinquished by: Signature	Received by: Signature	Date/Time
		11/23/98 12:15pm
Relinquished by: Signature	Received by: Signature	Date/Time

New York State Project: Yes ☐ No ☒

Requested Analyses

[illegible]

APPENDIX C

Soil-Gas Survey Results - Ville Garage Site

